

AMENDMENTS TO THE CLAIMS

1. (Previously presented) A gene detecting chip comprising:
a body part having a plurality of pin electrodes on an inside surface thereof;
a frame part having a recess on an inner surface thereof and being freely attachable to and detachable from said body part, said frame part being capable of accepting the pin electrodes and of being filled with a nucleic acid sample; and
a common electrode being a counter electrode for the pin electrodes, wherein said common electrode is arranged within the recess in a manner that said common electrode does not come into contact with the pin electrodes.
2. (Cancelled)
3. (Cancelled)
4. (Previously presented) The gene detecting chip according to claim 1, wherein genes having different nucleotide sequences are immobilized to said pin electrodes.
5. (Currently amended) The gene detecting chip according to claim 1, wherein a plurality of different nucleotide ~~sequences~~ sequences, selected from the group consisting of PCR products, oligonucleotides, mRNA, cDNA, PNA (~~peptidic nucleic acid~~), peptidic nucleic acid, and LNA (~~locked nucleic acid; Proligo, a trademark of LLC~~), a bicyclic nucleic acid wherein a ribonucleoside is linked between the 2'-oxygen and 4'-carbon atoms with a methylene unit, is immobilized to said pin electrodes.
6. (Previously presented) The gene detecting chip according to claim 1, wherein genes having the same nucleotide sequence are immobilized to said pin electrodes.
7. (Currently amended) The gene detecting chip according to claim 1, wherein PCR products, oligonucleotides, mRNA, cDNA, PNA (~~peptidic nucleic acid~~), peptidic nucleic acid or LNA (~~locked nucleic acid; Proligo, a trademark of LLC~~), a bicyclic nucleic acid wherein a ribonucleoside is linked between the 2'-oxygen and the 4'-carbon atoms with a methylene unit, having the same nucleotide ~~sequence~~ sequence, are immobilized to said pin electrodes.

8. (Previously presented) The gene detecting chip according to claims 6 or 7, further characterized by having a plurality of recesses capable of accepting said pin electrodes and capable of being filled with a nucleic acid sample, so that said plurality of recesses can be filled with different nucleic acid samples, respectively.

9. (Currently amended) The gene detecting chip according to claim 1, wherein the chip is capable of detecting gene based sequences, one base substituted SNPs, substitution of several bases, point mutations, translocations, ~~losses~~, deletions, amplifications, or triplet repeats.

10. (Previously presented) The gene detecting chip according to claim 1, wherein the surfaces of said pin electrodes are plated with gold.

11. (Previously presented) The gene detecting chip according to claim 1, wherein the surfaces of said pin electrodes are partially coated with a resin.

12. (Previously presented) The gene detecting chip according to claim 11, wherein said resin is PEEK or PTFE.

13. (Previously presented) The gene detecting chip according to claim 1, wherein a supporting member is further provided for supporting said pin electrodes, and said pin electrodes are erected on said supporting member.

14. (Previously presented) The gene detecting chip according to claim 13, wherein said pin electrodes are erected on said supporting member with spot electrodes interposed therebetween.

15. (Previously presented) The gene detecting chip according to claim 1, wherein a supporting member is further provided for supporting said pin electrodes, and one end of each of said pin electrodes is implanted on said supporting member.

16. (Original) The gene detecting chip according to any one of claims 13 to 15, wherein said supporting member is a circuit board.

17. (Previously presented) The gene detecting chip according to any one of claims 13 to 15, wherein the ends of said pin electrodes, which are in contact with or implanted on said supporting member, are enclosed by an epoxy resin or PTFE and thereby secured on said supporting member.

18. (Previously presented) The gene detecting chip according to any one of claims 13 to 15, wherein nucleotide sequences are immobilized only to ends of said pin electrodes that are not the ends in contact with or implanted on said supporting member.

19. (Previously presented) The gene detecting chip according to claim 4, wherein genes are fixed over the entirety of said pin electrodes.

20. (Currently amended) The gene detecting chip according to any one of claims 13, 14, 15 or 19 ~~further comprising a gap therein, characterized in that:~~ wherein a gap is formed between said body part and said frame part, said pin electrodes are deployed on said supporting member so as to protrude into said ~~gap; gap,~~ and a portion or entirety of said common electrode extends into said gap.

21. (Cancelled)

22. (Cancelled)

23. (Currently amended) A detecting chip for detecting one base substituted SNP and spot mutation in genes, comprising a main body part and a frame part that are freely attachable to and detachable from each other, characterized in that:

said main body part has a multiplicity of pin electrodes that are protruding measurement poles arranged in a matrix on the inner surface thereof;

said frame part has a recess on the inner surface thereof that is capable of accepting said multiplicity of pin electrodes when said main body part is mounted thereon and is capable of being filled with a nucleic acid sample;

a common electrode, that is a counter electrode deployed so as not to contact said pin electrodes, is provided in said recess; and

PCR products or oligonucleotides having different nucleotide sequences that are immobilized to said pin electrodes,

wherein voltages are applied between said common electrode and said pin electrodes so as to enable detection of currents.

24. (Previously presented) The gene detecting chip according to claim 23, wherein said pin electrodes are arranged in a multiplicity in matrices, and, by inserting the pin electrodes into each of receptacles accommodating PCR products or oligonucleotides having different nucleotide sequences, said PCR products or oligonucleotides having different nucleotide sequences are immobilized thereto.

25. (Cancelled)

26. (Previously presented) A gene detection apparatus comprising the gene detecting chip described in any one of claims 1 or 23 and a measurement apparatus which said detecting chip can be loaded into and removed from.

27. (Previously presented) The gene detection apparatus according to claim 26, wherein said temperature of said gene detecting chip can be controlled using a Peltier element.

28. (Currently amended) A detection method using the gene detecting chip claimed in any one of claims 4, 5, 6, 7 or 23, comprising the steps of:

filling said recess with the nucleic acid sample or a DNA gene-amplified from the sample;

performing a hybridization to form a double-strand nucleic acid between the nucleic acid sample or the DNA gene-amplified from the sample and any nucleotide sequences immobilized to the pin electrodes having mutually complementary base sequences;

removing from said recess and washing away any unhybridized nucleic acid sample or unhybridized DNA gene-amplified from the ~~sample~~ sample;

filling said recess with an electrolyte containing electrochemically active molecules such that said electrochemically active molecules are bonded to said double-strand nucleic acid;

applying voltages between said common electrode and said pin electrodes; and detecting values of currents flowing therebetween.

29. (Previously presented) A detection method using the gene detecting chip described in any one of claims 4, 5, 6, 7 or 23, comprising the steps of:

filling said recess with the nucleic acid sample or a DNA gene-amplified from the sample and electrolyte containing electrochemically active molecules;

performing a hybridization to form double-strand nucleic acid between the nucleic acid sample or the DNA gene-amplified from the sample and any nucleotide sequences immobilized to the pin electrodes having mutually complementary base sequences, while said electrochemically active molecules are bonded to said double-strand nucleic acid;

applying voltages between said common electrode and said pin electrodes; and detecting values of currents flowing therebetween.

30. (Currently amended) The detection method according to ~~claim~~ claim 28, wherein said electrochemically active molecules are bonded to said double-strand while controlling temperature.

31. (Previously presented) The detection method according to claim 28, wherein said electrolyte containing said electrochemically active molecules has as its effective component, ferrocene, catecholamine, metal bipyridine complex, metal phenanthrene complex, viologen, or a threading intercalator in which those compounds are incorporated.

32. (Cancelled)

33. (Previously presented) The detection method according to claim 29, wherein said electrochemically active molecules are bonded to said double-strand while controlling temperature.

34. (Previously presented) The detection method according to claim 29, wherein said electrolyte containing said electrochemically active molecules has as its effective

component, ferrocene, catecholamine, metal bipyridine complex, metal phenanthrene complex, viologen, or a threading intercalator in which those compounds are incorporated.